



**National Park Service
Northern Great Plains Fire Ecology
Annual Report
Calendar Year 2011**

A. Summary

2011 was a very productive year for the Northern Great Plains (NGP) fire ecology program. A total of 238 plots of various types were measured, an all time high for the program. Seven prescribed fires occurred in the NGP parks, resulting in 21 plots being burned, 19 of which were measured immediately post-burn.

This was the second year of a three year research project at Wind Cave N.P., Jewel Cave N.M., and Devils Tower N.M. in which Dan Swanson partnered with Amy Symstad of the USGS assessing the relationship between prescribed fire burn severity and target invasive plant species abundance taking into account a variety of pre- and post-fire environmental characteristics at each park. This past season two seasonal collections collected year one post-burn data on 90 plots at Wind Cave N.P. and Jewel Cave N.M. Data analysis comparing preburn to year one post-burn effects will be done during the winter/spring of 2012.

This year we continued collaboration with the NPS Northern Great Plains Inventory and Monitoring Network (I&M). Since the ten parks that the NGP fire ecology program monitor fire effects in are encompassed within the fourteen parks that the Northern Great Plains I&M program have, an excellent opportunity for collaboration existed. The NGP fire effects crew and I&M program installed 60 forest and fuels-style plots at Jewel Cave NM which are spatially balanced throughout the park and revisited once every five years by the I&M program. If any of these plots are burned in a prescribed burn project, the NGP fire effects program will revisit them at the standard FMH monitoring sequence. In addition, since both programs are using the same sampling design and monitoring protocols, we were able to coordinate plot sampling visits this year throughout our park network. Therefore, both programs are now benefiting from this collaboration by sharing data from their monitoring efforts.

This past August the monitoring crew and fire ecologist completed 48 composite burn index (CBI) plots within the American Elk RX burn unit at Wind Cave N.P. to ground truth the satellite-based burn severity assessment. The extended assessment revealed a mixed severity fire consisting of 48% low, 41% low-moderate, 5% moderate, and 4% high severity. This 3450 acre unit was burned in October 2010 and was the largest burn in Wind Cave N.P. history. Regression analysis will be completed this winter using the ground-truthed CBI plot data and the satellite-based dNBR values.

Table 1. Fire Effects Plot Workload (2011) and Total Plots Installed

Park	Monitoring Unit	Type of Plot (FMH, photo point, other)	Pre-burn 2011	Imm. Post 2011	Postburn (1-20 yrs) 2011	Annual Total (2011)	Total Plots
Agate Fossil Beds	Mixed grass prairie	Grassland Fuels Veg. Plot (GFV)	1	1	3	5	4
	Mixed grass prairie	I&M Veg Plot			3	3	6
Badlands	Mixed grass prairie	FMH Grass Plot			5	5	26
	Mixed grass prairie	GFV Plot					3
	Mixed grass prairie	I&M Veg Plot		7	7	14	21
	Shrubland	FMH Shrub Plot			2	2	4
Devils Tower	Ponderosa forest	FMH Forest Plot			2	2	14
	Mixed grass prairie	FMH Grass Plot			1	1	3
	Ponderosa forest	Forest, Fuels, and Veg. Plot (FFV)			3	3	3
	Ponderosa forest	Forest & Fuels Plot (F&F)					3
	Mixed grass prairie	I&M Veg Plot	3			3	3
Fort Union	Cottonwood forest	FMH Forest Plot					1
	Mixed grass prairie	FMH Grass Plot					2
Jewel Cave	Ponderosa forest	FFV Plot			1	1	6
	Ponderosa forest	F&F Plot					3
	Ponderosa forest	FMH Forest			3	3	3
	Ponderosa forest	I&M Forest & Fuels Plot	26			26	62
Knife River	Mixed grass prairie	GFV Plot		6	6	12	6
	Mixed grass prairie	FMH Grass Plot		2	2	4	6
	Green ash forest	FMH Forest Plot			1	1	3
	Mixed grass prairie	I&M Veg Plot	3		3	6	9
Mount Rushmore	Ponderosa forest	I&M Forest & Fuels Plot	13			13	60
Scotts Bluff	Mixed grass prairie	FMH Grass Plot		3	6	9	12
	Mixed grass prairie	I&M Veg Plot	14			14	16
	Juniper Woodland	FMH Forest Plot					2
	Shrubland	FMH Shrub Plot			1	1	3
Theodore Roosevelt	Mixed grass prairie	FMH Grass Plot			2	2	9
	Mixed grass prairie	GFV Plot					2
	Mixed grass prairie	I&M Veg Plot	6			6	7
	Juniper Woodland	I&M Veg Plot					5
	Cottonwood Forest	FMH Forest Plot			2	2	2
	Shrubland	FMH Brush Plot			2	2	5
Wind Cave	Mixed grass prairie	FMH Grass Plot			4	4	14
	Ponderosa forest	FMH Forest Plot			1	1	5
	Ponderosa forest	FFV Plot			3	3	3
	Ponderosa forest	F&F Plot			11	11	11
	Ponderosa forest	I&M Forest, Veg, & Fuels	7			7	14
	Ponderosa forest	I&M Forest & Fuels Plot			7	7	8
	Mixed grass prairie	I&M Veg plot	5			5	5
	Ponderosa forest	CBI plot			48	48	48
Photo Points, various parks	Mixed grass prairie	Photo point			3	3	15
	Ponderosa forest	Photo point			4	4	6
	Juniper woodland	Photo point	5			5	7
Total			83	19	136	238	422

Table 2. Fire Ecology Staffing 2011

Ecologist and Monitors	Starting Date	Ending Date	# of Pay Periods	READ qualified	Training and Development
Dan Swanson	1/1/2011	12/31/2011	26	No	Black Hills Area Bot/Eco workshop, Operational Leadership training, WICA climate change workshop, Adaptation Planning for Grasslands & Forests in the Black Hills Conference, MWR / IMR Fire Ecology Workshop, 7 fire operational periods
Valena Hofman	4/11/2011	10/22/2011	14	No	S-211, ATVO recert, 10-day assignment with BLHI WFM, worked on FALA, FFT1, 22 fire operational periods
Marcus Lund	5/16/2011	11/5/2011	12.5	No	S-234, ATVO recert, WFR recert, 10-day assignments with BLHI WFM, worked on FALB, 19 fire operational periods
Danielle Klaas	5/16/2011	8/18/2011	7	No	ATVO, botany training, 7 fire operational periods
Kevin Terlep	5/16/2011	8/18/2011	7	No	S-290 online course, ATVO, botany training,
Michael Bugosh	5/16/2011	8/18/2011	7	No	ATVO, opened and worked on FALB, opened FEMO, botany training

Table 3. 2011 Management Objectives and Monitoring Results

All results shown are 80% confidence intervals of the mean. Fuel reduction objectives/results are mean percent reduction from pre-burn to immediate post-burn. Stand density objectives/results are for five-year post-burn mean stand density. An underlined number of plots indicates that the minimum sample size has been attained for that variable.

Park	Monitoring Unit	Management Objective	Monitoring Results (80% C.I.)	Objective Achieved	Year Last Analysis Completed
Wind Cave N.P.	Native Mixed-grass Prairie	Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn	5% Decrease	No; N=7	2008
		Increase the relative cover of native forbs by at least 30% within two growing seasons after the burn	No change	No; N= <u>7</u>	
		Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.	23% Decrease	Yes; N=6	
	Non-native Grass Prairie	Increase the relative cover of native grasses by at least 20% within two growing seasons after the burn	59% Increase	Yes; N=5	2008
		Increase the relative cover of native forbs by at least 20% within two growing seasons after the burn	No change	No; N=5	
		Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.	No change	No; N= <u>5</u>	
	Ponderosa Pine Forest	Increase the relative cover of native herbs by at least 25% within two growing seasons after the burn	17% Decrease	No; N= <u>5</u>	2008
		Decrease the relative cover of non-native herbs by at least 25% within two growing seasons after the burn	No change	No; N=5	
		Reduce the density of overstory ponderosa pine (≥ 14.9 cm dbh) by at least 30% two growing seasons after the burn.	6% Decrease	No; N= <u>2</u>	
		Reduce the density of pole-size ponderosa pine (2.5 – 14.8 cm dbh) by at least 50% two growing seasons after the burn.	No change	No; N=9	
		Reduce the density of seedling ponderosa pine by at least 70% one growing season after the burn	78% Decrease	Yes; N= <u>2</u>	
		Reduce total fuel loading by at least 30% following one prescribed burn	21% Decrease	No; N= <u>2</u>	
Devils Tower N.M.	Non-native Grass Prairie	Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn	39% Increase	Yes; N=3	2008
		Increase the relative cover of native forbs by at least 20% within two growing seasons after the burn	74% Increase	Yes; N=3	
		Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.	49% Decrease	Yes; N=3	
	Ponderosa Pine	Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn	13% Increase	Yes; N=7	2008
		Increase the relative cover of native forbs by at least 10% within two growing seasons after the burn	36% Increase	Yes; N=6	
		Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.	No change	No; N=7	
Badlands N.P.	Western wheatgrass Mixed-grass Prairie	Reduce total fuel loading by at least 30% following one prescribed burn	38% Decrease	Yes; N=7	
		Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn	6% Decrease	No; N=20	
		Increase the relative cover of native forbs by at least 30% within two growing seasons after the burn	4% Increase	No; N=18	
		Decrease the relative cover of non-native grasses by at least 20% within two growing seasons after the burn.	No change	No; N=19	
	Non-native grass Prairie	Increase the relative cover of native grasses by at least 10% within two growing seasons after the burn	30% Increase	Yes; N=4	2008
		Increase the relative cover of native forbs by at least 10%	37% Increase	Yes; N=4	

		within two growing seasons after the burn Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.	No change	No; N=4	
Theodore Roosevelt N.P.	Kentucky Bluegrass Non-native Prairie	Increase the relative cover of native grasses by at least 20% within two growing seasons after the burn	57% Increase	Yes; N=3	2008
		Increase the relative cover of native forbs by at least 20% within two growing seasons after the burn	No change	No; N=3	
		Decrease the relative cover of non-native grasses by at least 30% within two growing seasons after the burn.	3% Decrease	No; N=3	
	Crested Wheatgrass Non-native Prairie	Increase the relative cover of native grasses by at least 20% within five growing seasons after the burn	No change	No; N=3	2008
		Decrease the relative cover of non-native grasses by at least 20% within five growing seasons after the burn.	No change	No; N=3	
	Native Mixed-grass Prairie	Increase the relative cover of native grasses by at least 20% within five growing seasons after the burn	8% Increase	No; N=3	2008
		Decrease the relative cover of non-native herbs by at least 20% within two growing seasons after the burn.	8% Increase	No; N=3	
Agate Fossil Beds N.M	Native Mixed-grass Prairie	Increase the relative cover of native grasses by at least 20% within two growing seasons after the burn.	5% Increase (Yr 1)	TBD	2009
		Decrease the relative cover of non-native herbs by at least 20% within two growing seasons after the burn.	31% Decrease (Yr1)	TBD	

B. Fire ecologist accomplishments and areas of focus

Dan assisted with the development and edits of the fire regime component for Jewel Cave N.M., Devils Tower N.M., and Theodore Roosevelt N.P.'s natural resource condition assessment documents that have been completed. In addition he provided input and edits on the Badlands N.P. climate change vulnerability assessment document that's nearing completion. Dan is also currently involved in a climate change research project at Wind Cave N.P. and has provided information on the area's fire regime and historical climate data.

In October Dan gave a fire ecology presentation to 7th grade students at The Nature Conservancy's Whitney Preserve near Hot Springs, SD.

I am working closely with the I&M vegetation ecologist and database manager as we dive into the next phase of sharing our monitoring data by exporting our databases. We are working out some of the kinks right now, e.g. ensuring our species lists and macroplot names match, and some minor data entry coding differences on the biological variables, but hope to have each others monitoring data within our databases by the end of winter. We envision ultimately having both program's data housed in park databases located on either the I&M or Wind Cave N.P. server. This would then eliminate the exporting of each others data since any data entry changes would be made on one park database.

Table 4. Fire Ecologist 2011 Accomplishments/Focus Areas

Category	Percent Time	Accomplishments and/or areas of activities
Planning	6%	Determining fire effects travel costs to area parks, training of field crew in FFI
Presentations	5%	Scientific meetings, park staff, public, etc.
NPS Meetings/ task groups	8%	Park, I&M, & FESC meetings; NGP Technical Committee meeting; BADL Climate Change Vulnerability Assessment Working group; Worked on JECA, DETO, and THRO Natural Resource Condition assessments; Fire regime and historical climate data input for the WICA climate change research project
Interagency work	1%	Black Hills Area Ecologist & Botanist Workshop
Wildfire Assignments	0%	Slow fire season!
Prescribed fire projects	3%	FEMO on 6 RX fires (7 operational periods)
Non-fire fuels projects	0%	
Research	10%	Invasive plant species research project – training field crew
Data Collection	12%	Invasive plant species research project – WICA, JECA, and DETO; CBI plot work at WICA
Data entry, check	3%	CBI data entry for American Elk RX; BADL, KNRI, SCBL, & THRO data checking
Data management & analysis	30%	Northern Great Plains area parks fire effects database management and analysis
Supervision/Admin	15%	Hiring, supervision, travel, payroll, etc.
Training	3%	Botany, Supervisory, EEO training, Operational Leadership, MWR/IMR fire ecology workshop
Travel out-of-park for plot or project work	2%	Travel to SCBL, DETO, BADL, & THRO for monitoring and RX fires
Miscellaneous	2%	NGP fire management web site, Writing burn reports

C. Fire effects crew accomplishments and areas of focus**Table 5. Fire Effects Crew 2011 Accomplishments/Focus Areas**

Category	Percent Time	Notes
FMH plots	12%	Re-reading of FMH plots (Forest, Grass, and Brush)
NGP Plots	8%	Re-reading of burn-unit specific plots (FFV, GFV, photo points)
I&M Plots	30%	Installing I&M style plots. At JECA/MORU these were installed park-wide. All other parks' installs fell inside active burn units
WUI plots	0%	
CBI plots	5%	Reading 48 CBI plots within the American Elk RX at WICA
Wildfire assignments		Wildfire assignments, including local I.A., details with the Black Hills Wildland Fire Module
Prescribed fire projects	7%	Prescribed fires in the NGP park group, calendar year 2011
Non-fire fuels projects	0%	Estimated amount of time spent assisting with non-fire fuels projects; include mechanical fuel reduction using chainsaws or other, herbicide/mowing, and associated READ activities

Travel out-of-park for plot or project work	4%	Travel to AGFO, SCBL, DETO, BADL, THRO, & KNRI for monitoring and RX fires
Data entry, check	10%	100% of plot data entered & 80% checked in FFI as of 1/17/12
Data analysis	0%	
Supervision/Admin	12%	Travel, payroll, seasonal hiring, field season preparation, equipment upkeep and repair, end of season closeout
Training	8%	Each crewmember had botany training & ATVO training. Additional courses taken by some individuals include S-211, S-234, & S-290.
Miscellaneous	4%	physical training, fuel sampling, herbarium updates.

D. Additional Program Information

Table 6. Planning - 2011

Park	Does Park have written DFCs? (yes or no)	Date Park-level Monitoring Plan completed (or revised)	Total # of Project- or Community-level Monitoring Plans (not just 2011)	Assisted with how many BAER plans in 2011?
Agate Fossil Beds N.M.	no	2004	0	0
Badlands N.P.	no	2003	0	0
Devils Tower N.M.	yes	2004	0	0
Fort Union Trading Post NHS	no	2007	0	0
Jewel Cave N.M.	no	2004	0	0
Knife River Indian Villages NHS	no	2007	0	0
Mount Rushmore N.M.	yes	2007	0	0
Scotts Bluff N.M.	yes	2004	0	0
Theodore Roosevelt N.P.	no	2007	0	0
Wind Cave N.P.	no	2005	0	0

Table 7. Monitoring - 2011

Park	% 2011 Data Entered	% 2011 Data Quality Checked	# Prescribed Fires Monitored*	# Non-fire Fuels Treatments Monitored*	# Wildfires Monitored*	# BAER Treatments Monitored*
Agate Fossil Beds N.M.	100%	100%	3	0	0	0
Badlands N.P.	100%	100%	4	0	0	0
Devils Tower N.M.	100%	100%	5	0	0	0
Fort Union Trading Post NHS	100%	100%	1	0	0	0
Jewel Cave N.M.	100%	100%	2	0	0	0
Knife River Indian Villages NHS	100%	100%	5	0	0	0
Mount Rushmore N.M.	100%	100%	0	1	0	0
Scotts Bluff N.M.	100%	100%	5	0	0	0
Theodore Roosevelt N.P.	100%	50%	4	0	0	0
Wind Cave N.P.	100%	0%	5	0	1	0

* Number of treatment units with treatment effects monitoring conducted. Include pre-burn and post-burn monitoring but not burn-day monitoring.

Table 8. Communicating Results - 2011

Park	# of Project Monitoring Reports completed in 2011	# of Annual meeting(s) with Park staff	# of Formal presentations of results	Do you use Minitab?*
Agate Fossil Beds N.M.	0	1	1	Yes
Badlands N.P.	1	1	1	Yes
Devils Tower N.M.	1	1	1	Yes
Fort Union Trading Post NHS	0	0	1	Yes
Jewel Cave N.M.	0	1	1	Yes
Knife River Indian Villages NHS	0	0	1	Yes
Mount Rushmore N.M.	0	0	1	Yes
Scotts Bluff N.M.	0	1	1	Yes
Theodore Roosevelt N.P.	0	0	1	Yes
Wind Cave N.P.	1	1	2	Yes

* This information will help to assess Minitab multi-user license needs.

Table 9. Research - 2011

Park	Are research needs identified in FMP or Monitoring Plan? (yes or no)	# of Proposals Submitted in 2011	# of Proposals Funded in 2011	# of Research Projects Supported in 2011*	Additional Comments
Agate Fossil Beds N.M.	no	0	0	0	
Badlands N.P.	no	0	0	0	
Devils Tower N.M.	no	0	0	1	Invasive Spp project
Fort Union Trading Post NHS	no	0	0		
Jewel Cave N.M.	no	0	0	1	Invasive Spp project
Knife River Indian Villages NHS	no	0	0	0	
Mount Rushmore N.M.	no	0	0	0	
Scotts Bluff N.M.	no	0	0	0	
Theodore Roosevelt N.P.	no	0	0	0	
Wind Cave N.P.	no	0	0	1	Invasive Spp project

*Number of funded research projects, new or ongoing, supported by the fire ecology program including logistical info or support, staffing, etc.

E. 2012 Direction

I am in the process of hiring a new lead fire effects monitor right now. It looks like we will have two returning fire effects crew members for their fourth and sixth seasons respectively. Their wealth of knowledge and experience should help the new lead monitor transition into their position smoothly and enable our program to continue to collect high quality data. Due to looming budget cuts in the near future, our program will continue to be without an assistant lead monitor. I understand that we could face some very trying times in the near future and be in the undesirable position of deciding which plots to monitor in each park if we end up with a skeleton crew due to a limited fuels budget. This will require our program to focus on the plots which are most critical in assessing treatment objectives as well as possibly not reading some monitoring statuses. I look forward to working with the Northern Great Plains I&M program and sharing the data between our programs. We hope to have shared FFI park databases on one server by Spring 2012.

F. Optional Information

To help in the ongoing effort to improve FFI, please include any feedback or suggestions here based on your experiences using FFI.

It would be very helpful if the user could save queries in the query builder. Numerous queries including calculating percent cover, tree density, tree basal area, and species richness are done repeatedly between parks (databases) and efficiency would significantly improve if I could go back to a saved query on a particular monitoring variable.

INSTRUCTIONS FOR UPLOADING 2011 ANNUAL REPORT

1. Save your report as a PDF file using the following file naming convention "2011 *Park/Network Name* Annual Report.pdf".
2. Go to the NPS Fire Ecology Sharepoint site (<http://npsfamshare.nps.doi.net/wildlandfire/firescience/fireecology/default.aspx>). In Fire Ecology Documents, upload your report to the 2011 Park and Network Fire Ecology Program Annual Reports folder.
3. Please e-mail your regional ecologist, Nate Benson, and MaryBeth Keifer to let us know when you get your report uploaded.

Call MaryBeth Keifer (603-795-2333) or Nate Benson (208-387-5219) if you have any questions or problems.